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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/901,972 | 07/09/2001 | Fernando Pedone | 10010654-1 | 7275 |

7590 07/15/2004

HEWLETT-PACKARD COMPANY
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Fort Collins, CO 80527-2400

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| EXAMINER |
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LOHN, JOSHUA A

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| ART UNIT | PAPER NUMBER |
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2114

DATE MAILED: 07/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/901,972

Applicant(s)

PEDONE ET AL.

Examiner

Joshua A Lohn

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 15-25 is/are rejected.
- 7) ☒ Claim(s) 12-14 and 26-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 07/09/2001.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4-10, 15, 19, and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wisner et al., United States Patent Application Publication 2002/0163910, filed May 1, 2001.

As per claim 1, Wisner discloses a distributed data center system protocol that includes providing a client having a failure detector (Wisner, ¶0025) and a plurality of data centers (Wisner, ¶0021) each including a plurality of database servers (Wisner, ¶0028). Wisner also discloses the selecting one of the plurality of data centers to be a primary data center with the other of the plurality of data centers to be a backup data center (Wisner, ¶0067) and providing communications from the client to the primary database server and the backup database servers (Wisner, ¶0024, ¶0026, Figure 1). Wisner fails to explicitly state the selecting of primary and backup database servers, the selecting of new primaries during failure, and adjusting communications in the event of a failure. Wisner does teach these aspects in use with the data movers.

Wisner discloses selecting one of the plurality of data movers in the primary data center to be a primary data mover with the other of the plurality of data movers therein to be a backup data mover (Wisner, ¶0052) and the plurality of data movers in the backup data center to be

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backup data movers (Wisner, ¶0054). Wisner also discloses selecting one of the backup data movers as a new primary data mover when one of the backup data movers detects a failure of the primary data mover (Wisner, ¶0052, where detection comes via controller); and providing further communications from the client to the new primary data mover when the client suspects a failure of the primary data mover (Wisner, ¶0025).

It would have been obvious to one skilled in the art at the time of the invention to improve the invention of Wisner by treating the database servers in the same fashion as the data movers.

This would have been obvious because Wisner discloses having multiple database servers (Wisner, ¶0028). Wisner further discloses a desire to avoid service disruption to the users of the various servers (Wisner, ¶0029), and a desire to have a configuration to provide redundant resources at both data centers (Wisner, ¶0035). Wisner discloses having plural data movers in both data centers to provide improved reliability in both the individual data center and in the system as a whole (Wisner, ¶0054). The database servers and data movers exist in similar configurations, each data center having a plurality. This similarity of structure would have provided motivation for one of ordinary skill in the art to apply similar active and backup characteristics, as those shown with the data movers (Wisner, ¶0052), to the database servers. This would obviously have improved the overall reliability as seen by the user and desired by Wisner (Wisner, ¶0028). The result of this combination would have been database servers with the same failover structure and characteristics as those exhibited by the data movers.

As per claim 4, Wisner additionally discloses providing the plurality of database servers includes providing local databases therefor; and providing the communications includes the primary database server sending a transaction operation to the local database and executing the transaction operation (Wisner, ¶0026).

As per claim 5, Wisner additionally discloses providing a transaction operation from the client to the primary database server and the backup database servers; and executing the transaction operation and a second transaction operation in the same order both in the primary database server and the backup database server (Wisner, ¶0037).

As per claim 6, Wisner additionally discloses providing first and second durability levels of operation wherein employing the first durability level in the primary database server executes the transaction operation faster than the second durability level of operation (Wisner, ¶0037, where the first durability level “does not follow up on whether... changes were received”, and the second durability level “waits for a message sent by the standby site”, which would decrease operation speed).

As per claim 7, Wisner additionally discloses providing the plurality of database servers in the primary and backup data centers includes each of the plurality of database servers having failure detectors (Wisner, ¶0061) and the client having a failure detector with properties of strong completeness and eventual weak accuracy (Wisner, ¶0043, where the intelligent controller is connected to the client through the WAN and will exhibit strong completeness by

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detecting errors through failure information from the data centers, but eventual weak accuracy because it will only suspect failure when failure information is received).

As per claim 8, Wisner additionally discloses providing the client includes providing the client with disaster detectors with properties of strong completeness (Wisner, ¶0043, where the intelligent controller is connected to the client through the WAN and will exhibit strong completeness by detecting errors through the monitored failure information) and eventual strong accuracy (Wisner, ¶0063, where the eventual strong accuracy comes from the monitoring that is continual and will suspect a system of failure, and monitor to detect it, even if no failure has occurred).

As per claim 9, Wisner additionally discloses providing the plurality of database servers in the primary and backup data centers includes each of the plurality of database servers having disaster detectors with properties of strong completeness and strong accuracy (Wisner, ¶0061, where the layers within the data centers will detect all errors, strong completeness, but only will suspect errors when a fault has already been detected within the layer, or connecting layers, strong accuracy).

As per claim 10, Wisner additionally discloses providing the primary database server includes providing a local database therefor; and executing a transaction operation includes the primary database server sending the transaction operation to the local database (Wisner, ¶0026).

As per claim 15, Wisner discloses providing a client having a failure detector (Wisner, ¶0025) and a plurality of data centers (Wisner, ¶0021) each including a plurality of database servers (Wisner, ¶0028) operatively interconnected (Wisner, ¶0026). Wisner further discloses selecting one of the plurality of data centers to be a primary data center with the other of the plurality of data centers to be a backup data center (Wisner, ¶0067), providing a transaction operation from the client to the primary database server and the backup database servers (Wisner, ¶0024, ¶0026, Figure 1), and providing error messages from the backup database servers to the client indicating that the backup database servers are not the primary database server (Wisner, ¶0034, where the error would be indicated to all systems attached to the backup unit). Wisner fails to explicitly state the selecting of primary and backup database servers, the selecting of new primaries during failure, and adjusting communications in the event of a failure. Wisner does teach these aspects in use with the data movers.

Wisner discloses selecting one of the plurality of data movers in the primary data center to be a primary data mover with the other of the plurality of data movers in the primary data center to be a backup data mover (Wisner, ¶0052) and the plurality of data movers in the backup data center to be backup data movers (Wisner, ¶0054) and executing the transaction operation by the primary data mover (Wisner, ¶0052). Wisner also discloses selecting one of the backup data movers as a new primary data mover when one of the backup data movers detects a failure of the primary data mover (Wisner, ¶0052, where detection comes via the controller) and selecting one of the backup data movers as a new primary data mover when one of the backup data movers suspects a failure of the primary data mover (Wisner, ¶0052, where lack or

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response is a suspicion of failure). Wisner discloses also providing the transaction operation from the client to the new primary data mover when the client detects a failure or change of the primary data mover (Wisner, ¶0025), executing the transaction operation by the new primary data mover when the transaction operation is provided from the client to the new primary data mover (Wisner, ¶0052), and returning the result of the executed transaction operation from the new primary data mover to the client (Wisner, ¶0052, where the interaction with the file system would provide results to the client through any interface servers).

It would have been obvious to one skilled in the art at the time of the invention to improve the invention of Wisner by treating the database servers in the same fashion as the data movers.

This would have been obvious because Wisner discloses having multiple database servers (Wisner, ¶0028). Wisner further discloses a desire to avoid service disruption to the users of the various servers (Wisner, ¶0029), and a desire to have a configuration to provide redundant resources at both data centers (Wisner, ¶0035). Wisner discloses having plural data movers in both data centers to provide improved reliability in both the individual data center and in the system as a whole (Wisner, ¶0054). The database servers and data movers exist in similar configurations, each data center having a plurality. This similarity of structure would have provided motivation for one of ordinary skill in the art to apply similar active and backup characteristics, as those shown with the data movers (Wisner, ¶0052), to the database servers. This would obviously have improved the overall reliability as seen by the user and desired by Wisner (Wisner, ¶0028). The result of this combination would have been database servers with the same failover structure and characteristics as those exhibited by the data movers.

As per claim 19, Wisner additionally discloses providing a second transaction operation from the client to the primary database server and the backup database servers; and executing the transaction operation and the second transaction operation in the same order both in the primary database server and the backup database server (Wisner, ¶0037).

As per claim 21, Wisner additionally discloses providing the plurality of database servers in the primary and backup data centers includes each of the plurality of database servers having failure detectors (Wisner, ¶0061) and the client having a failure detector with the properties of: strong completeness wherein, if the primary database server fails at time t , then there is a time $t' > t$ after which the primary database server is permanently suspected of failure by the client and by the backup database server; and eventual weak accuracy wherein, if the primary database server that does not fail, then there is a time after which the primary database server is never suspected of failure by the client and by the backup database server (Wisner, ¶0043, where the intelligent controller is connected to the client through the WAN and will exhibit strong completeness by detecting errors through failure information from the data centers, but eventual weak accuracy because it will only suspect failure when failure information is received).

As per claim 22, Wisner additionally discloses providing the client includes providing the client with disaster detectors with the properties of: strong completeness wherein, if the primary data center fails at time t , then there is a time $t' > t$ after which the primary data center is permanently suspected of failure by the client (Wisner, ¶0043, where the intelligent controller is

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connected to the client through the WAN and will exhibit strong completeness by detecting errors through the monitored failure information), and eventual strong accuracy wherein, if the primary data center that does not fail, then there is a time after which the primary data center is never suspected of failure by the client (Wisner, ¶0063, where the eventual strong accuracy comes from the monitoring that is continual and will suspect a system of failure, and monitor to detect it, even if no failure has occurred).

As per claim 23, Wisner additionally discloses providing the plurality of database servers in the primary and backup data centers includes each of the plurality of database servers having disaster detectors with the properties of: strong completeness wherein, if the primary data center fails at time t , then there is a time $t' > t$ after which the primary data center is permanently suspected of failure by the backup database servers; and strong accuracy wherein, if the primary data center that does not fail, then the primary data center is never suspected of failure by the backup database servers (Wisner, ¶0061, where the layers within the data centers will detect all errors, strong completeness, but only will suspect errors when a fault has already been detected within the layer, or connecting layers, strong accuracy).

As per claim 24, Wisner additionally discloses providing the primary database server includes providing a local database therefor; and executing the transaction operation includes the primary database server sending the transaction operation to the local database (Wisner, ¶0026).

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wisner in view of Hobbs, "Database Administration: Hot Standby for Rdb Systems", http://www.oracle.com/rdb/product_info/html_documents/hotstdby.html, published 2001.

As per claim 20, Wisner additionally discloses providing first and second durability levels of operation wherein: employing the first durability level in the primary database server executes the transaction operation faster than the second durability level of operation (Wisner, ¶0037, where the first durability level "does not follow up on whether... changes were received", and the second durability level "waits for a message sent by the standby site", which would decrease the operation speed). Wisner fails to disclose the second durability level including assurance that the transaction will be backed up in the event of a disaster on the primary.

Hobbs discloses employing the second durability level in the primary database server executes the transaction operation with the assurance that if the primary data center suffers a disaster, the plurality of backup databases in the backup data center will receive the transaction operation (Page 5, "Commit" section).

It would have been obvious to one skilled in the art at the time the invention was made to use the definition of the commit durability level to provide the assurance of disaster reliability in the system of Wisner.

This would have been obvious because Wisner, while not providing the details, promotes the use of the techniques provided by Hobbs that allow for the waiting of a message response (Wisner, ¶0037). The commit level of action includes this message wait and would have obviously been utilized to provide the most reliable system desired by Wisner.

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Claims 2, 3, 11, 16, 17, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wisner, in view of Frolund et al., United States Patent number 6,442,552, filed June 30, 2000.

As per claim 2, Wisner fails to disclose providing an abort operation.

Frolund discloses providing an abort operation from the client to the primary database server when the client suspects a failure of the primary database server (Frolund, col. 2, lines 4-10, where the lack of response is a suspicion of failure resulting in abort).

It would have been obvious to one skilled in the art at the time of the invention to include the abort abilities in the invention of Wisner.

This would have been obvious because both systems use the same multi-tier architecture (Wisner, ¶0028; Frolund, col. 1, lines 12-24). It is useful in this architecture to provide an ability to abort transactions, so that a client does not remain waiting indefinitely for a reply from a faulty device (Frolund, col. 2, lines 4-10).

As per claim 3, Wisner fails to disclose ensuring that each transaction is only executed once.

Frolund discloses checking whether the primary database server has already executed a transaction operation for a transactional job corresponding to the same transactional job before executing the transaction operation (Frolund, col. 4, lines 27-44, where the unique identifier will ensure a check that the same transactional job is not executed more than once).

It would have been obvious to one skilled in the art at the time of the invention to include the unique identifier and ability to avoid repeating transactions, disclosed by Frolund, in the invention of Wisner

This would have been obvious because Wisner discloses a strong desire to provide reliable and functional services (Wisner, ¶0003). Frolund discloses that the ability to execute a transaction "exactly once" is beneficial to the reliability of a client service (col. 1, lines 52-57). It would have been obvious to one skilled in the art to implement the abilities of Frolund in the invention of Wisner to provide for an "exactly once", reliable execution of a client request.

As per claim 11, Wisner discloses keeping the backup data current (Wisner, ¶0037), but fails to disclose the transaction parameters to be broadcast during a transaction.

Frolund discloses communicating from the primary database server to the backup database servers by broadcast communication (Frolund, col. 5, lines 42-51) of a transaction unique identification, statements associated with the transaction operation, and control information from the primary database server to the backup database servers (Frolund, the commit command will include the identification number of the command that is included in all requests, col. 4, lines 27-34, the count value acts as a statement associated with the transaction, col. 4, lines 35-44, and the commit is the control information being transmitted).

It would have been obvious to one skilled in the art at the time of the invention to include the unique identifier, and all other transaction parameters that help provide the ability to avoid repeating transactions, disclosed by Frolund, in the invention of Wisner.

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This would have been obvious because Wisner discloses a strong desire to provide reliable and functional services (Wisner, ¶0003). Frolund discloses that the ability to execute a transaction "exactly once" is beneficial to the reliability of a client service (col. 1, lines 52-57). It would have been obvious to one skilled in the art to implement the abilities of Frolund in the invention of Wisner to provide for an "exactly once", reliable execution of a client request.

As per claim 16, Wisner fails to disclose providing an abort operation.

Frolund discloses providing an abort operation from the client to the primary database server when the client detects a failure of the primary database server. (Frolund, col. 2, lines 4-10, where the lack of response is a suspicion of failure, resulting in abort).

It would have been obvious to one skilled in the art at the time of the invention to include the abort abilities in the invention of Wisner.

This would have been obvious because both systems use the same multi-tier architecture (Wisner, ¶0028; Frolund, col. 1, lines 12-24). It is useful in this architecture to provide an ability to abort transactions, so that a client does not remain waiting indefinitely for a reply from a faulty device (Frolund, col. 2, lines 4-10).

As per claim 17, Wisner fails to disclose ensuring that each transaction is only executed once.

Frolund discloses checking whether the primary database server has already executed a transaction operation for a transactional job corresponding to the same transactional job before

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executing the transaction operation (Frolund, col. 4, lines 27-44, where the unique identifier will ensure a check that the same transactional job is not executed more than once).

It would have been obvious to one skilled in the art at the time of the invention to include the unique identifier and ability to avoid repeating transactions, disclosed by Frolund, in the invention of Wisner

This would have been obvious because Wisner discloses a strong desire to provide reliable and functional services (Wisner, ¶0003). Frolund discloses that the ability to execute a transaction "exactly once" is beneficial to the reliability of a client service (col. 1, lines 52-57). It would have been obvious to one skilled in the art to implement the abilities of Frolund in the invention of Wisner to provide for an "exactly once", reliable execution of a client request.

As per claim 25, Wisner discloses keeping the backup data current (Wisner, ¶0037), but fails to disclose the transaction parameters to be broadcast during a transaction.

Frolund discloses communicating from the primary database server to the backup database servers by broadcast communication (Frolund, col. 5, lines 42-51) of a transaction unique identification, statements associated with the transaction operation, and control information from the primary database server to the backup database servers (Frolund, the commit command will include the identification number of the command that is included in all requests, col. 4, lines 27-34, the count value acts as a statement associated with the transaction, col. 4, lines 35-44, and the commit is the control information being transmitted).

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It would have been obvious to one skilled in the art at the time of the invention to include the unique identifier, and all other transaction parameters that help provide the ability to avoid repeating transactions, disclosed by Frolund, in the invention of Wisner.

This would have been obvious because Wisner discloses a strong desire to provide reliable and functional services (Wisner, ¶0003). Frolund discloses that the ability to execute a transaction "exactly once" is beneficial to the reliability of a client service (col. 1, lines 52-57). It would have been obvious to one skilled in the art to implement the abilities of Frolund in the invention of Wisner to provide for an "exactly once", reliable execution of a client request.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wisner in view of Frolund, in further view of Oracle 8: SQL Reference, Release 8.0, published December 1997.

As per claim 18, Wisner discloses providing the plurality of database servers includes providing local databases therefor and executing the transaction operation includes the primary database server sending the transaction operation to the local database (Wisner, ¶0026). Wisner does not disclose waiting for a reply for this or any other aspects of the transaction. Wisner also fails to disclose the broadcast aspects of the database update.

Frolund discloses waiting for a reply after sending the transaction to the local database (Frolund, col. 5, lines 46-49). Frolund further discloses executing the transaction operation includes waiting for a reply from the local database to the primary database server and sending the reply to the client (Frolund, col. 5, lines 42-65), and also includes sending a commit request to the primary database server in response to the reply (Frolund, col. 5, lines 30-51). Frolund discloses executing the transaction operation includes the primary database server broadcasting a transaction unique identification, statements associated with the transaction operation, and control information to the backup data server in the primary data center, and the plurality of backup data servers in the backup data center (Frolund, the commit command will include the identification number of the command that is included in all requests, col. 4, lines 27-34, the commit command is statement associated with the transaction, and the execution of the two-phase commit is the control information being transmitted, col. 5, lines 36-65).

It would have been obvious to one skilled in the art at the time of the invention to include the unique identifier, and all other transaction parameters and responses that help provide the ability to avoid repeating transactions, disclosed by Frolund, in the invention of Wisner.

This would have been obvious because Wisner discloses a strong desire to provide reliable and functional services (Wisner, ¶0003). Frolund discloses that the ability to execute a transaction "exactly once" is beneficial to the reliability of a client service (col. 1, lines 52-57). It would have been obvious to one skilled in the art to implement the abilities of Frolund in the invention of Wisner to provide for an "exactly once", reliable execution of a client request.

Frolund and Wisner fail to disclose the commit statement associated with the transaction operation being an SQL statement.

Oracle 8: SQL Reference discloses having the commit command in a SQL standard form.

It would have been obvious to one skilled in the art at the time of the invention to implement the commit command in an SQL compatible manner.

This would have been obvious because the commit command of SQL is used to make permanent all changes performed in the transaction (Oracle 8: SQL Reference, COMMIT, page 1), and the commit command of Frolund is also used to make changes permanent (Frolund, col. 5, lines 49-51). Further, since the SQL reference states that SQL is accepted as the standard relational database management system language (Oracle 8: SQL Reference, Introduction, page 1), it would have been obvious to implement the commit command in SQL to provide this standard compatibility of use.

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Allowable Subject Matter

Claims 12-14 and 26-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion


The prior art made of record and not relied upon is considered pertinent to applicant's disclosure is provided on form PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joshua A Lohn whose telephone number is (703) 305-3188. The examiner can normally be reached on M-F 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoleil can be reached on (703) 305-9713. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JAL


SCOTT BADERMAN
PRIMARY EXAMINER